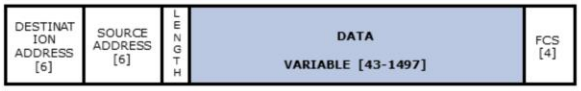
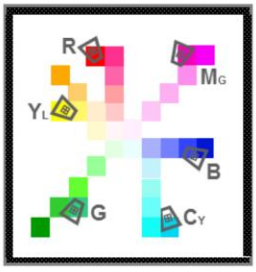
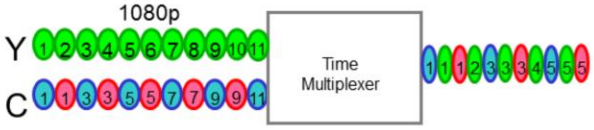
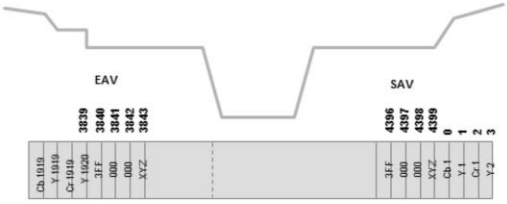
Section 9 - Kayenne/Karrera Appendix

- Digital Video (2)
- SMPTE 424M - 1080p Standard (18)
- Historical Switcher Video Flow (20)
- Key Clip and Gain v Clip Hi and Clip Lo (21)
- Shaped and Unshaped Video (23)
- Ethernet and IP (27)









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9 - 1

Digital Video

- Sampling
- Luminance and Chrominance
- Multiplexing
- De-multiplexing
- Luminance Levels
- Chrominance Levels
- Active Video
- Horizontal Blanking
- Serialization
- NRZI
- Eye Pattern
- HANC

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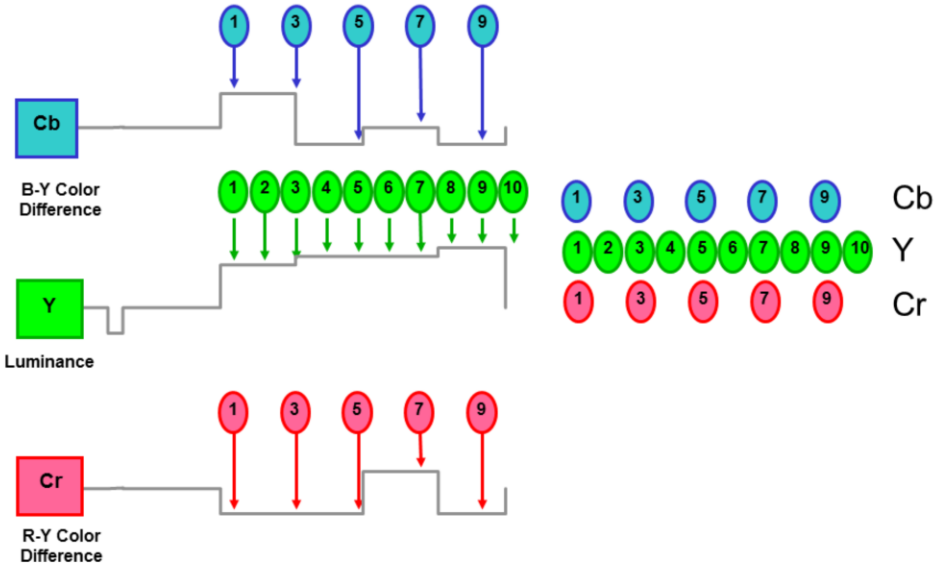
9 - 2

Component Analog Video Sampling



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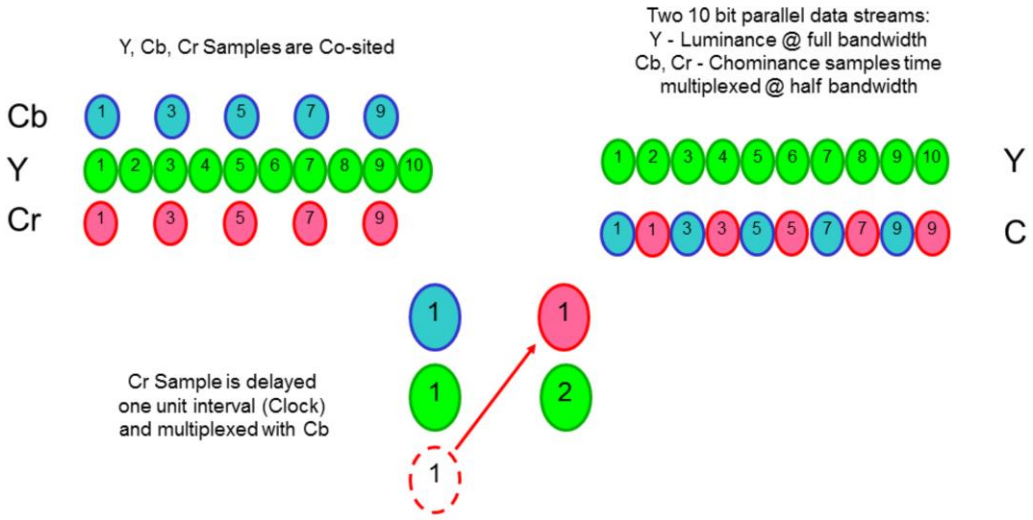
9 - 3

Component Luminance and Chrominance



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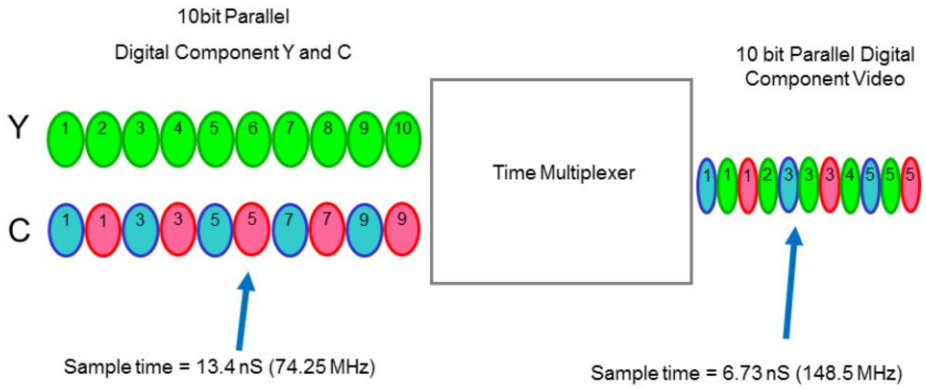
9 - 4

Digital Multiplexing



Note: All values are for 1080i/60

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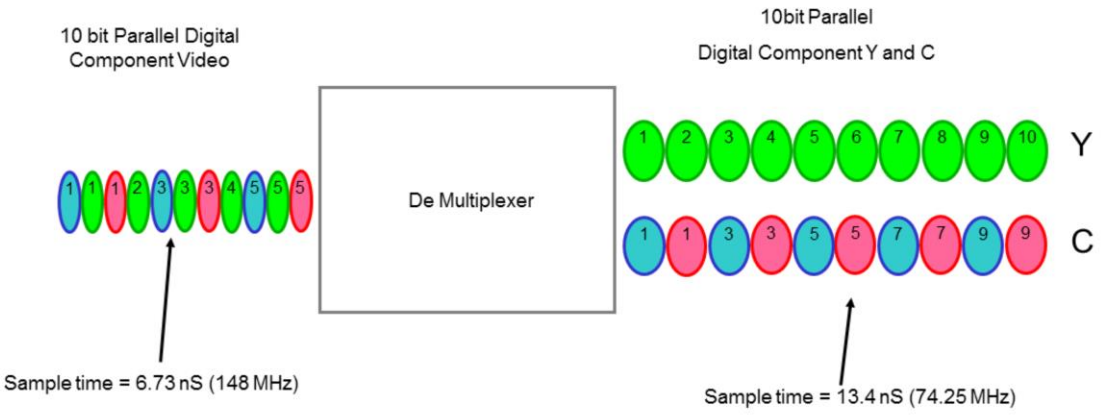
9 - 5

Digital De-Multiplexing



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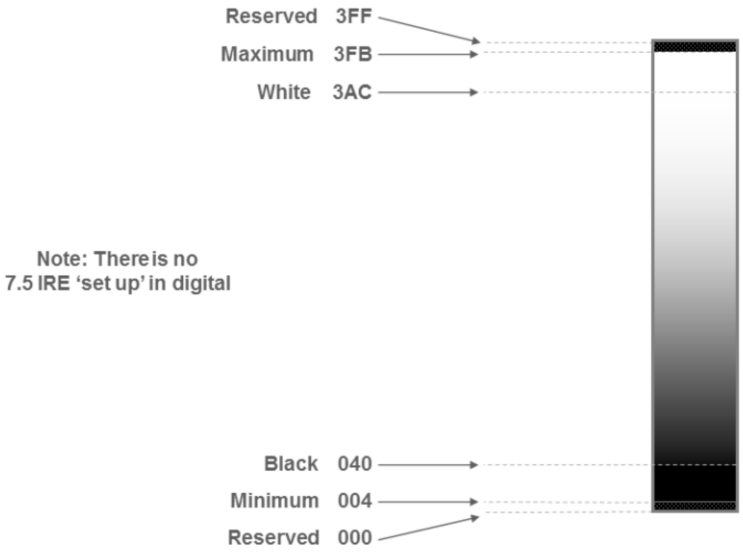
9 - 6

Digital Luminance Levels



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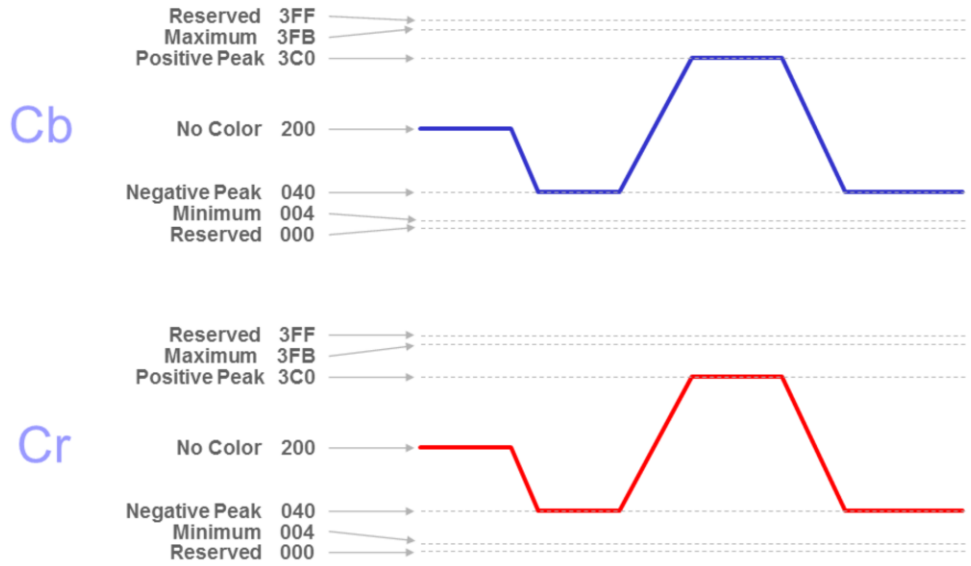
Digital Chrominance Levels



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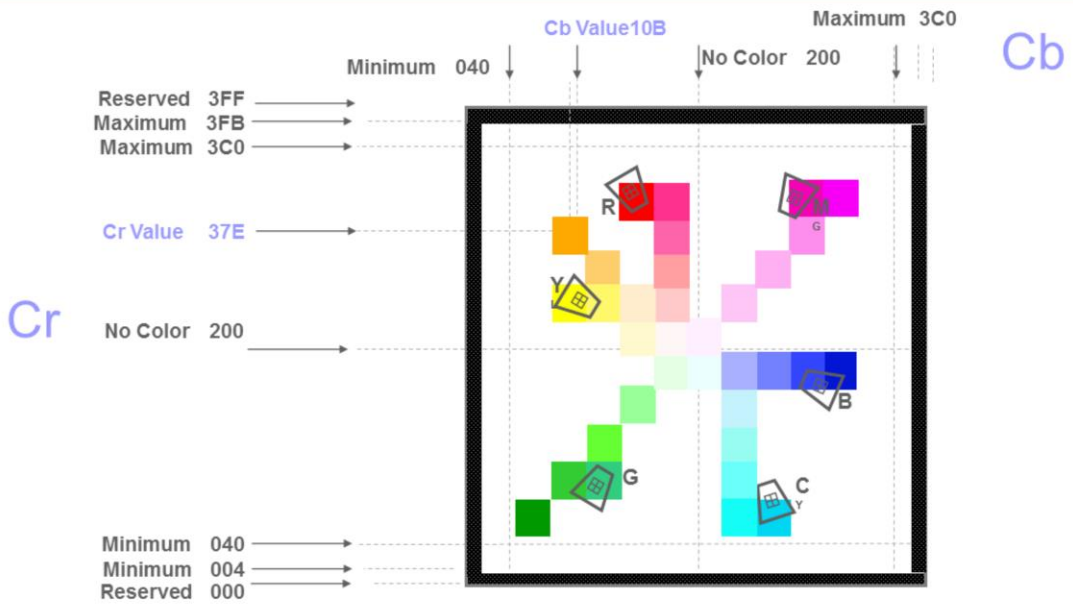
9 - 8

Digital Vector Representation



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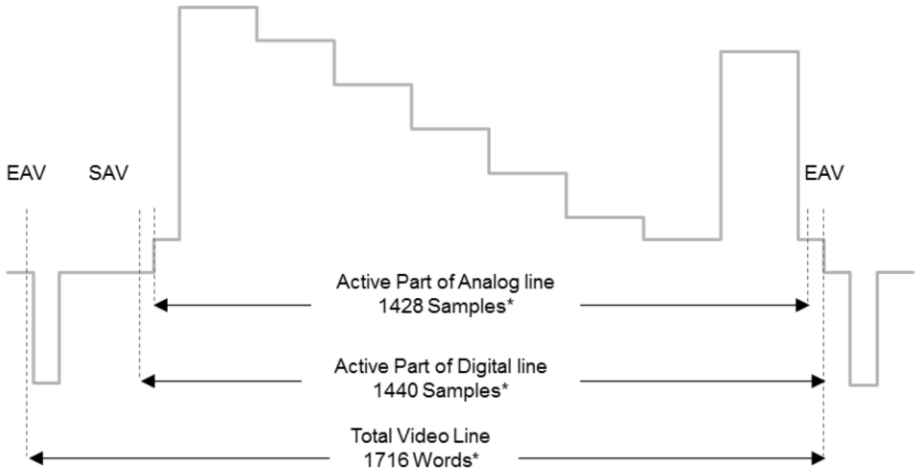
9 - 9

Active Video (SD)



*** Values for 525 Formats**

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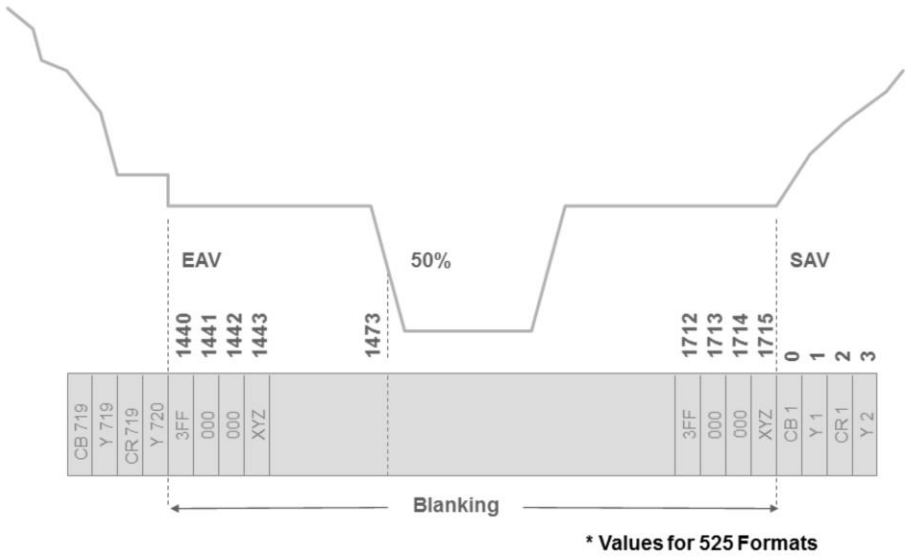
9 - 10

Horizontal Ancillary Period (HANC)



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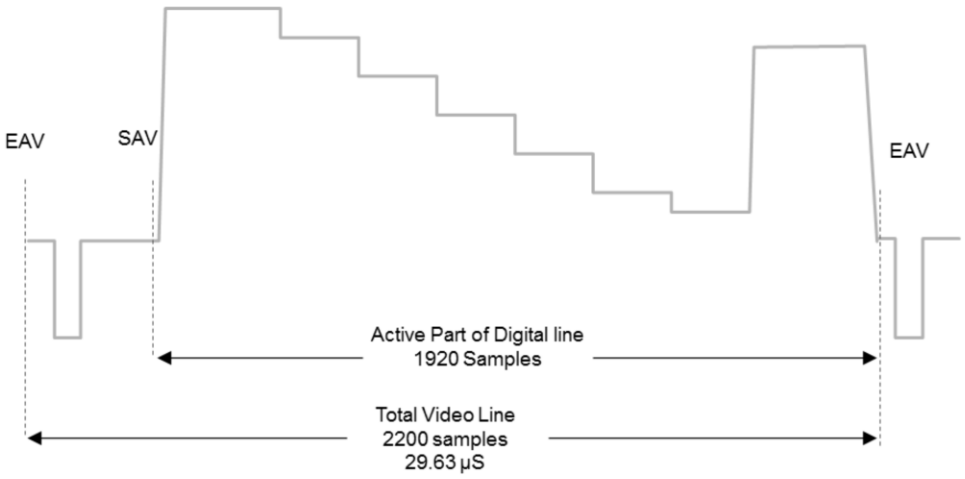
Active Video (HD)



Note: Values for 1080i/60 Format

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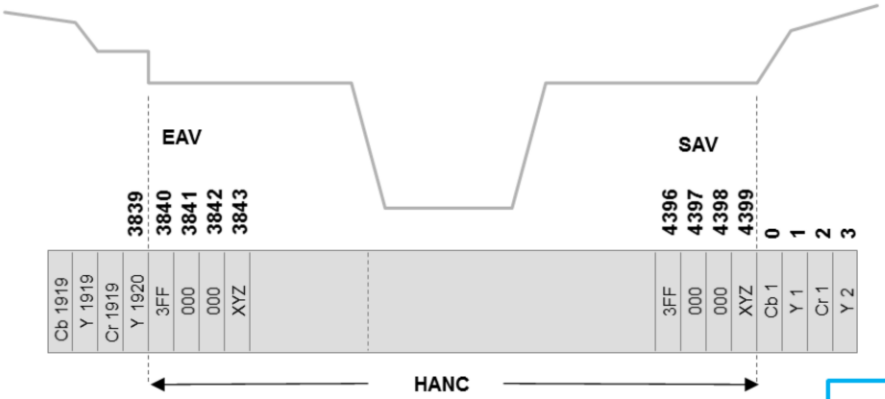
Horizontal Ancillary Period (HANC)



Note: Values for 1080i/60 Format

XYZ bits

MSB = 1
SAV = 0, EAV = 1
Field 1 = 0, Field 2 = 1
Blanking = 0, Active = 1
P3 = 0
P2 = 0
P1 = 0
P0 = 0
= 0
LSB = 0

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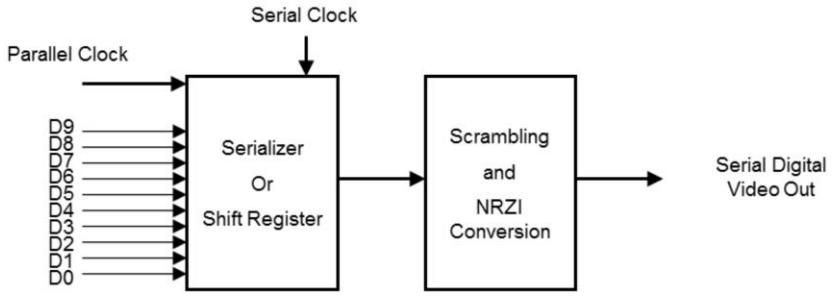
Parallel to Serial Conversion



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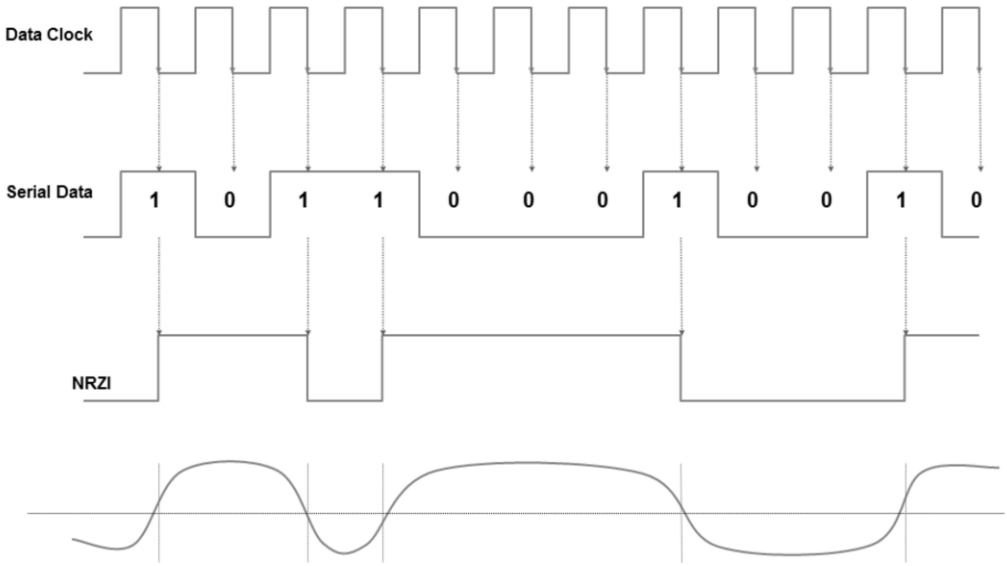
Serial Digital NRZI Conversion



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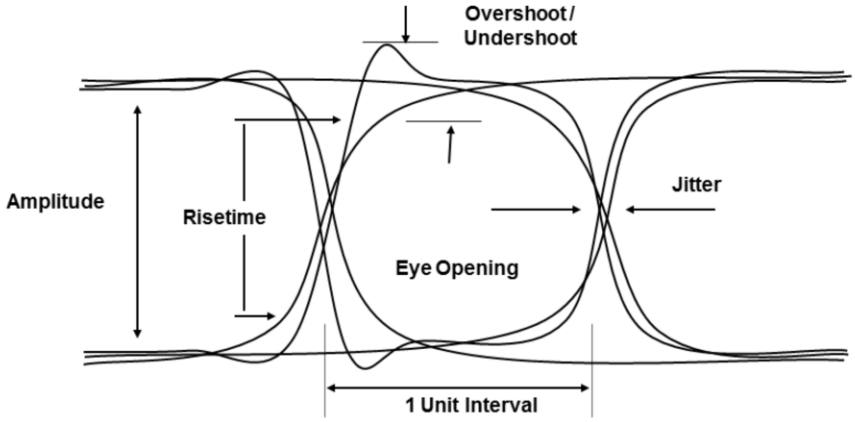
Serial Digital Eye Pattern



Parameter	Unit ratio	270 Mbps	1.485 Gbps
Amplitude	1 +/- .2	800 +/-160 mV	800 +/-160 mV
Overshoot	+/- .2	+/-160 mV	+/-160 mV
Pulse Width	1	3.7 nS	670 pS
Jitter	+/- .2	+/- 740 pS	+/- 134 pS
Risetime	.2 - .8	740 pS	134 pS

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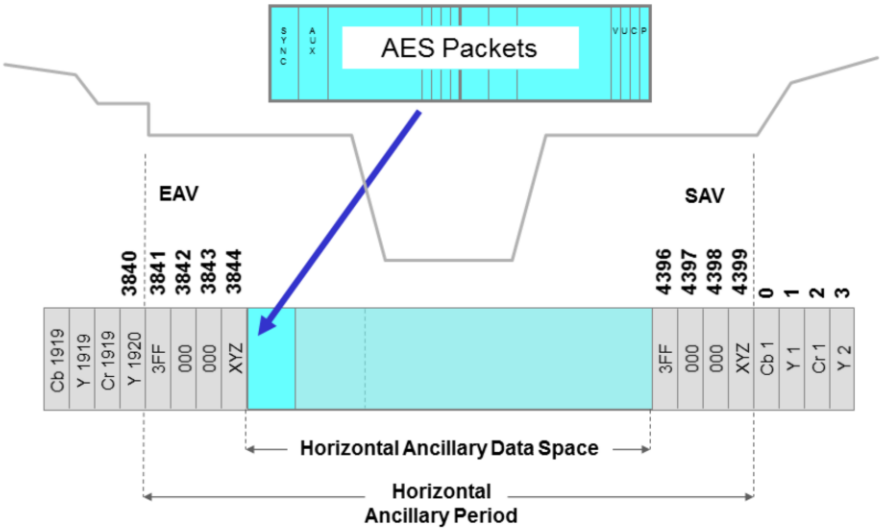
Digital Video HANC - AES Embedded Audio



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9 - 17

Digital Video SMPTE 424M Standard

- SMPTE 424M is a standard which expands upon SMPTE 259M, 259M, 344M and 292M, allowing for bit-rates of 2.970 Gbit/s and 2.970/1.001 Gbit/s over a single-link coaxial cable
- These bit-rates are sufficient for 1080p video at 50 or 60 frames per second
- The signal formats carried over SMPTE 424M are specified in SMPTE 425M
- Within this standard there are two formats known as Level A and Level B
  - The Level A format is a full format transport of a 1920 x 1080 progressive frame with the frame rate of 50 or 60 Hz
  - The Level B format is a multiplexing scheme where two streams of 1920 x 1080 interlaced 50 or 60 Hz video is transported over a 3G SDI link

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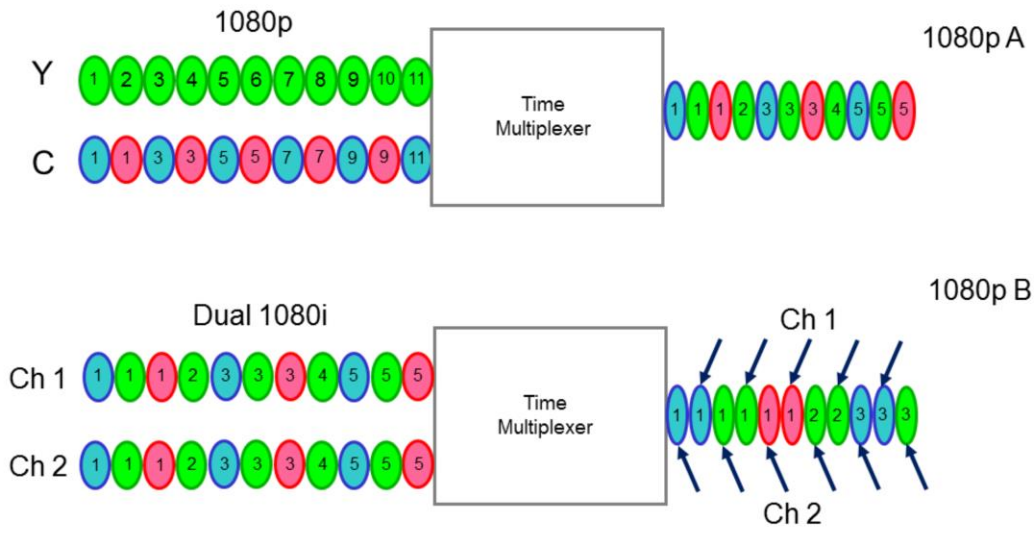
- This standard is part of a family of standards that define a Serial Digital Interface commonly known as 3G-SDI
- Several manufacturers are supporting only one or the other.
- Note that currently SONY Cameras who only support 3G SDI Level B.

Digital Video SMPTE 424M Standard



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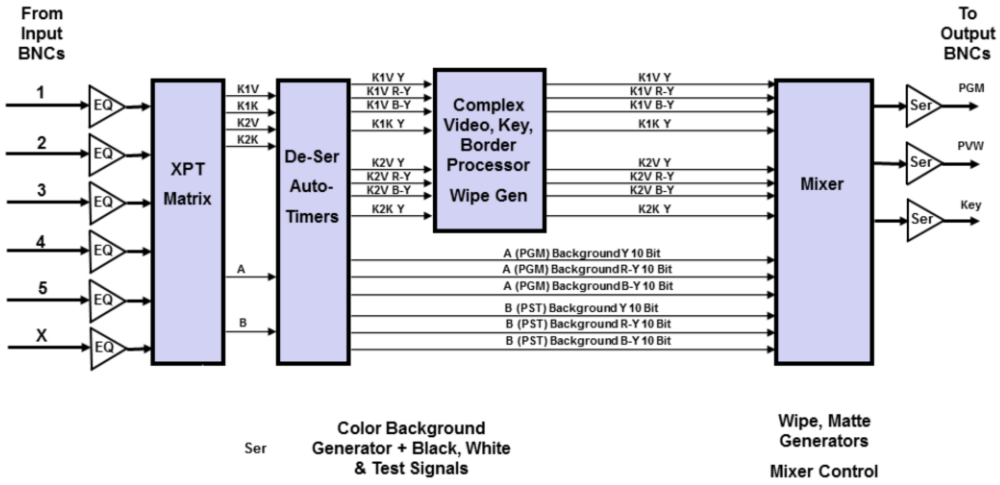
• The basic difference therefore between the two standards is that the 1080p-A standard is a full 1080p format, whereas the 1080p-B standard is in fact 2 1080i signals (V/V or V/K) multiplexed together.

Basic Switcher Functional Flow – Simple Mix Effects



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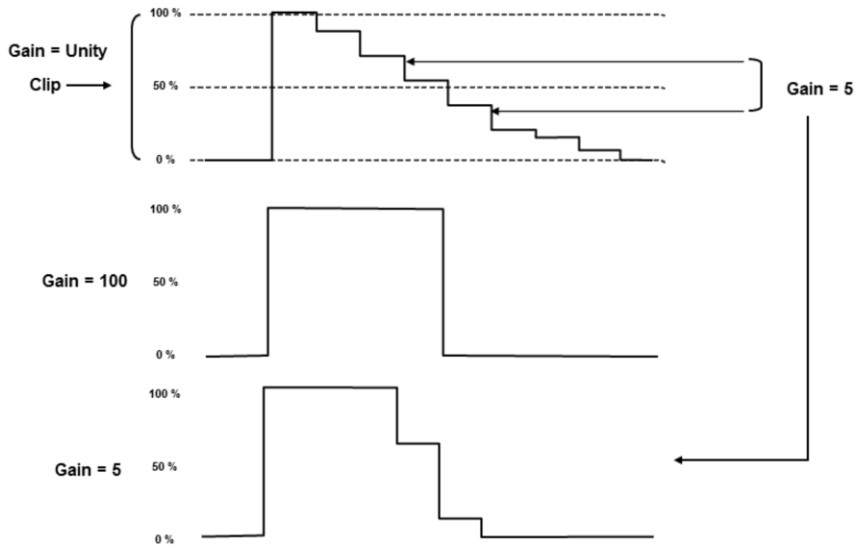
Keyer Controls - Clip and Gain



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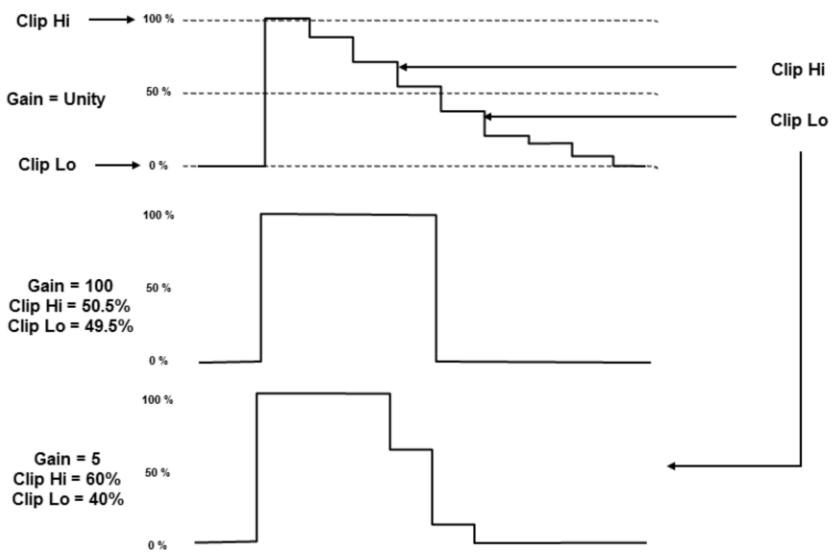
9 - 21

Keyer Controls - Clip Hi - Clip Lo



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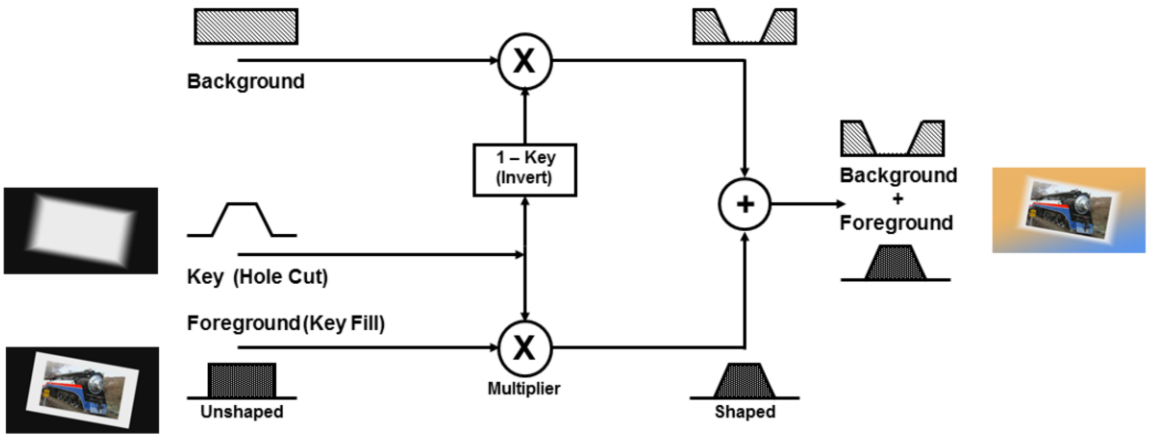
9 - 22

Unshaped Keyer Keying Operation



Multiplicative (Unshaped) keying operation

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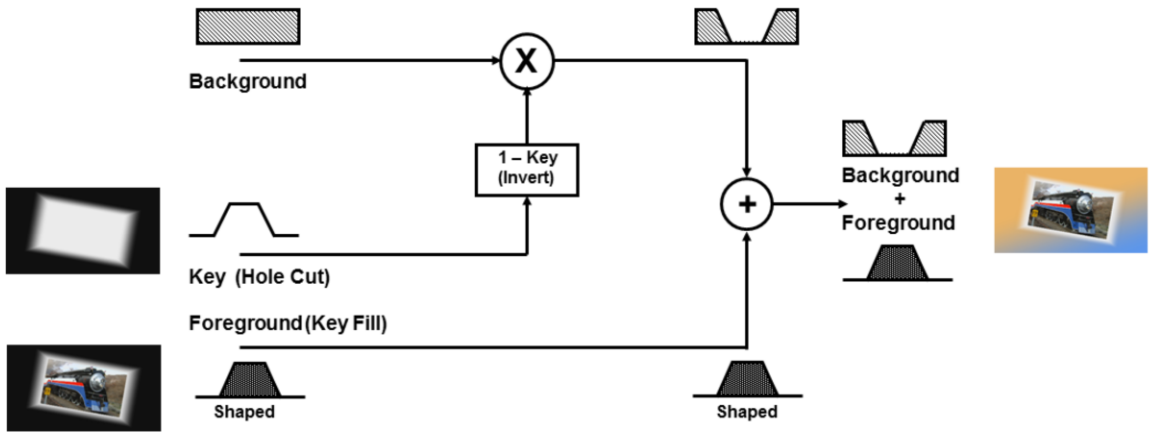
9 - 23

Shaped Keyer Keying Operation



Additive (Shaped) keying operation

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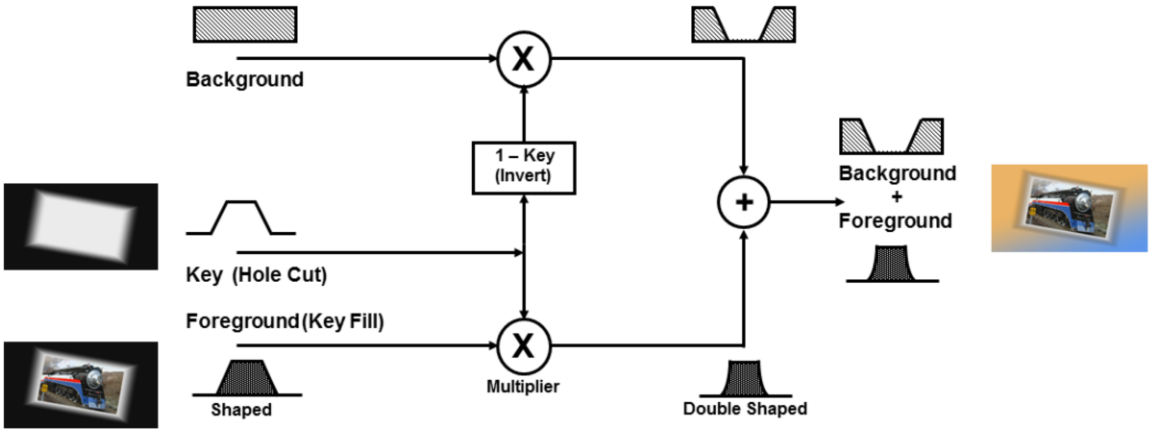
Incorrect Shaped Keyer Keying Operation



Shaping already shaped video (double multiply)

Dark halo is always present around edge of key

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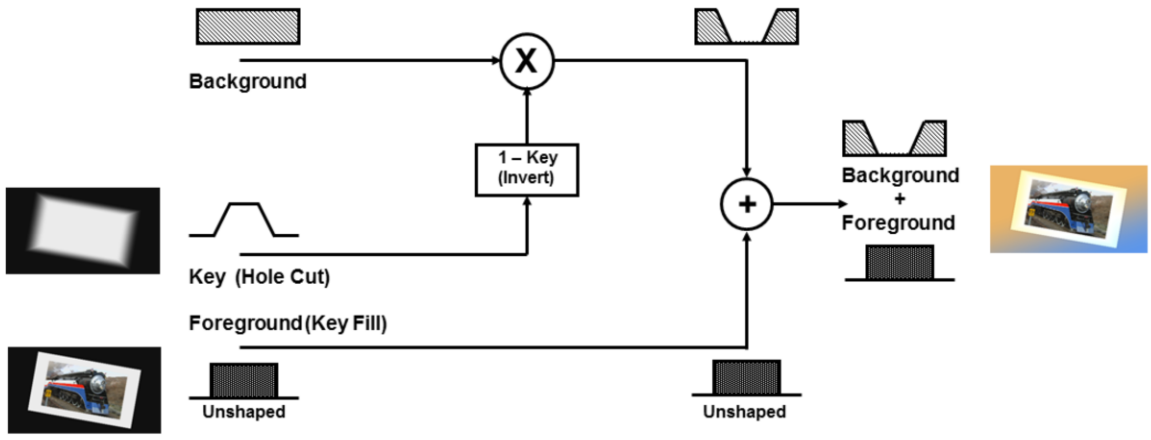
Incorrect Unshaped Keyer Keying Operation



Unshaped video that is not being shaped

White halo is always present around edge of key

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Ethernet Protocols

- Ethernet Frame
  - Source and Destination Addresses
  - IP Encapsulation
  - Negotiated Ethernet Frame Size 64 -1500 Bytes
- Collision Detection and Resolution
  - CSMA/CD 0 -102 mS retry
- Broadcast Addresses
- Address Resolution

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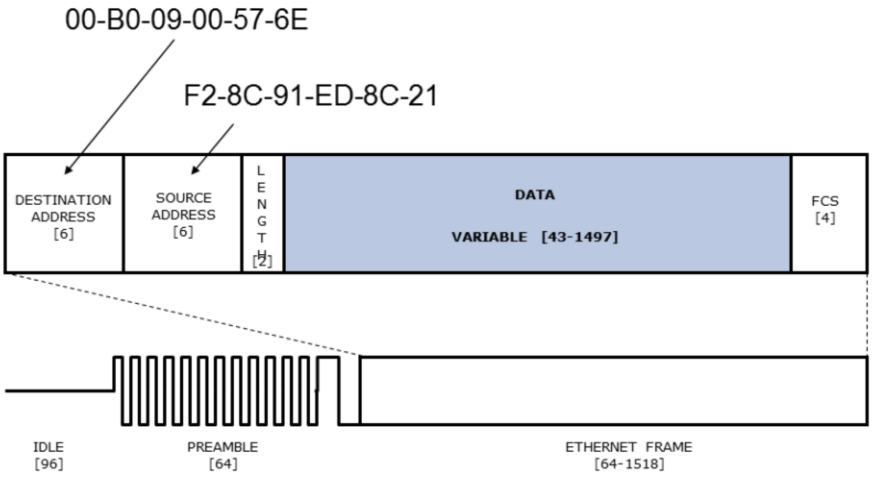
Ethernet Frame



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IP Addressing

IP ADDRESS	192	168	0	122
SUBNET MASK	255	255	255	0
SUBNET	192	168	0	122

NETWORK ID HOST ID

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IP addresses are expressed in Dotted Decimal Notation.

• Class A - This address uses the first byte for the network number and the remaining three bytes for the host number. The first byte ranges in decimal value from 1 to 127. A Class A address fits an Internet situation that has up to 128 networks and up to 16,777,216 hosts per network.

• Class B - This address uses the first two bytes for the network number and the last two bytes for the host number. The first byte ranges in decimal value from 128 to 191. A Class B address fits an intermediate situation with up to 16,384 networks and up to 65,536 hosts per network.

• Class C - This address uses the first three bytes for the network number and the last byte for the host number. The first byte ranges in decimal value from 192 to 223. A Class C address fits a situation with up to 2,097,152 networks, and less than 256 hosts per network.

IP Subnet Masks

NETMASK	255.255.255.0	11111111 . 11111111 . 11111111 . 00000000
SOURCE AD	192.168.0.240	10011000 . 10101000 . 00000000 . 11110000
DEST AD	192.168.0.126	10011000 . 10101000 . 00000000 . 01111110
RESULT		00000000 . 00000000 . 00000000 . XXXXXXXX
NETMASK	255.255.255.0	11111111 . 11111111 . 11111111 . 00000000
SOURCE AD	192.168.0.240	10011000 . 10101000 . 00000000 . 11110000
DEST AD	192.168.1.126	10011000 . 10101000 . 00000001 . 01111110
RESULT		00000000 . 00000000 . 00000001 . XXXXXXXX

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Subnet Mask separates the IP address into 2 parts, so that the Host can determine which part of the IP address identifies the network and which part defines to the local computers. On a Class C network, the first 3 sets of numbers are "blocked". Using the Subnet Mask, the IP address can be used to determine which packets belong on the local network and which do not. By combining the destination address with the Subnet Mask, a computer can recognize whether that address is on or off the local network (or segment). If it determines that the address is off the local network segment, the message will then be sent to the Default Gateway for forwarding beyond the local network. In order for this to be accomplished, the Default Gateway must have its own IP address on the local network. Local systems then send packets to that address for forwarding.

Address Resolution Protocol

- ARP Utilization Reduces Network Congestion
- Valid Entries are Maintained for 20 Minutes
- IP Address Resolution Sequence
  - Transmitting Station Sends ARP Request With Ethernet Broadcast Address
  - All Stations Must Listen
  - Targeted Station Responds With Ethernet Address
  - Transmitting Station Applies Discovered Ethernet Address to Packet

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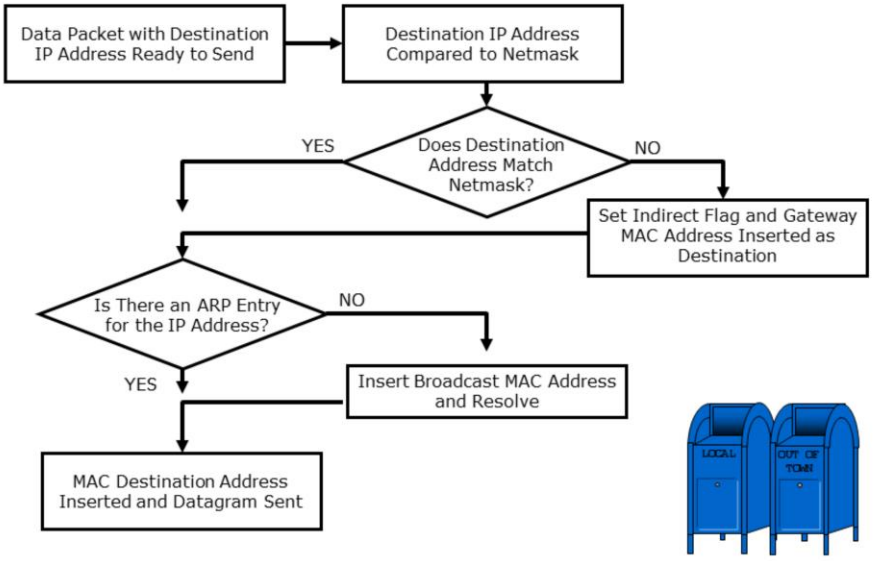
ARP Address Resolution Protocol - ARP requests must be sent as broadcasts. A device with the broadcasted IP address must respond with its Ethernet address. Most systems treat the ARP table as a cache, and will clear entries if they have not been used within a certain period of time.

IP Routing Operations



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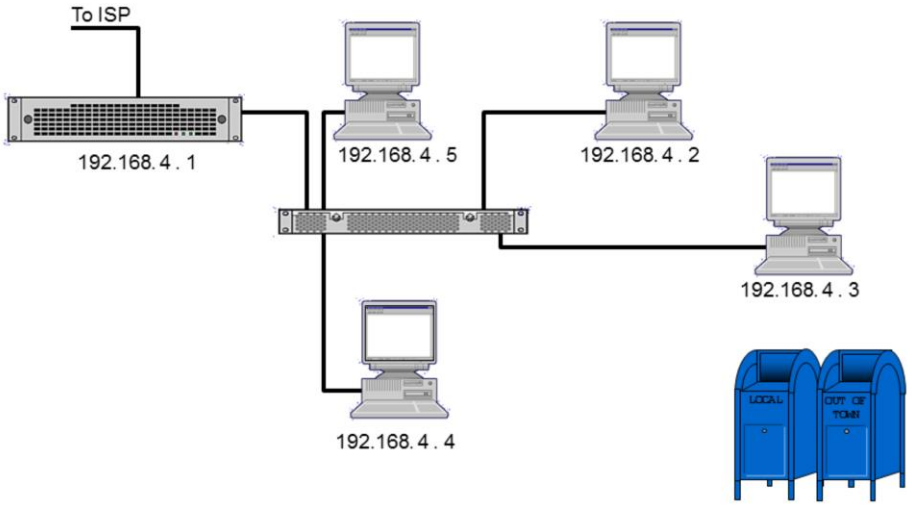
Gateway Routing



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